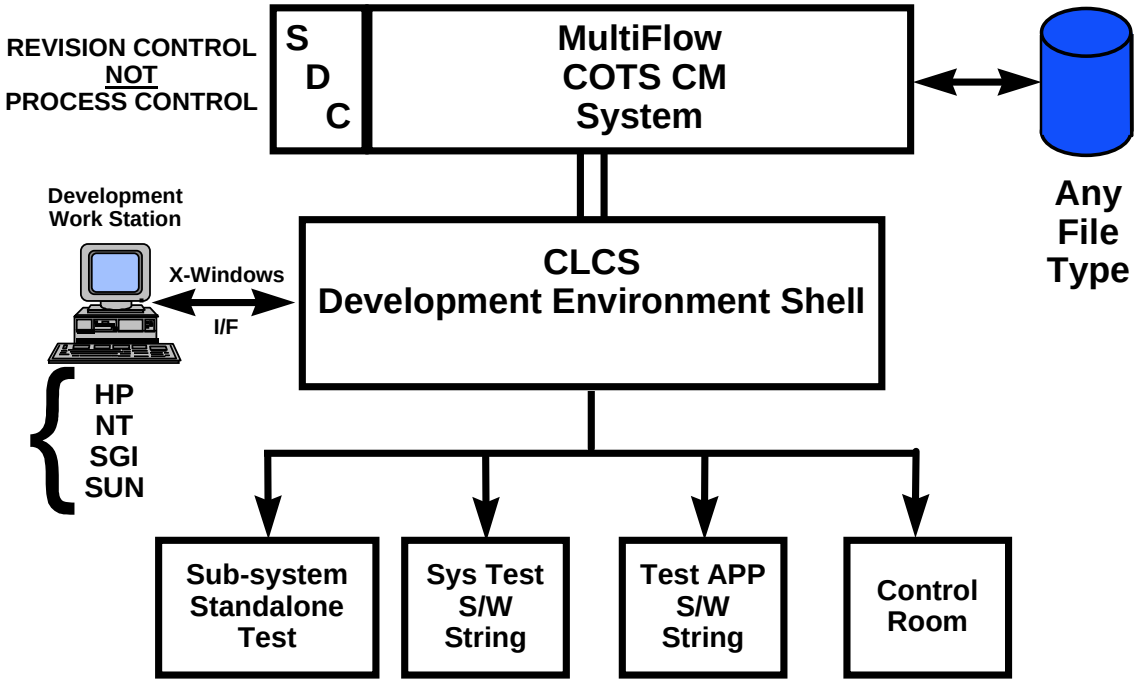
1. CSC Name

1.1 CSC Name Introduction

1.1.1 CSC Name Overview

In this section provide a short description of the purpose of the CSC, where it is resident, and what it does. The section is in paragraph format. It also contains a Conception Level data flow diagram. The words in the paragraph should refer to the blocks in the diagram by way of explanation. The following diagram is a conception level diagram.



1.1.2 CSC Name Operational Description

In this section provide a short description of how the CSC does what it does. This section can be thought of as a tutorial on how the CSC works. It may make reference to the data flow diagram and should address all of the interfaces and, at a high level, the data that flows across each.

This section is in paragraph format.

1.2 CSC Name Specifications

1.2.1 CSC Name Groundrules

Provide a bulleted list of groundrules and assumptions that relate to the CSC. Things that should be included in this section include:

- Things that the CSC will not do that someone might expect it to do.
- Things that you expect to be provided to you by:
  - Another CLCS CSCI or CSC.
  - External system H/W or S/W interface (identified by ICD number).
  - New CLCS H/W interface (identified by specification).

- Any limitations or constraints that are placed on the CSC.

  Note: Software interface requirements identified in the groundrules for one CSCI/CSC usually impose requirements on other CSCI/CSCs which must be documented in the functional requirements of those CSCI/CSCs

First, second, third, and fourth level bullets should follow the following convention:

- First Level Bullet #1. Bullet - 12 point.
- First Level Bullet #2. . Bullet - 12 point.
  - Second Level Bullet #1.
  - Second Level Bullet #2.
    - Third Level Bullet #1. Bullet - 8 point.
    - Third Level Bullet #2. Bullet - 8 point.
      - Fourth Level Bullet #1. Bullet - 8 point diamond.
      - Fourth Level Bullet #2. Bullet - 8 point diamond.
  - Second Level Bullet #3.
- First Level Bullet #3. . Bullet - 12 point.

1.2.2 CSC Name Functional Requirements

Provide a short (1 or 2 sentence) description and a numbered list of functional requirements, organized by major/minor function, that describe what ~~how~~ this CSC ~~performs its intended functionality~~ is required to do. These requirements must be written in concise, unambiguous language; each requirement must be stated as a complete sentence. Requirements must be stated in quantifiable, measurable parameters, or actions to be taken when a set of conditions is satisfied. The section should be organized in a logical manner (e.g., by major & minor function) rather than by placing requirements in random order within it. Things that should be included in this section include:

- Major functions of the CSC.
- What each function does. This is a list of requirements that state what the function does.
- All Inputs the CSC responds to and what it does with each.
- Also describe, where applicable, each of the following
  - Errors that the CSC will trap.
  - The CSC's reaction to each of the errors.
- Any data that the CI uses that is adaptable (e.g., user profiles or user selected options, coefficients used to calculate linearization from table build or the OLDB).
- Critical processing requirements (e.g., if a CSC has priority as well as normal queuing to perform some processing at a higher than normal priority these must be specified).
- If the CSC has multiple operating modes the modes are described and a matrix included which identifies which functions or requests are legal in each mode.

Follow the numbering convention described below:

Example

The Functional Requirements for CSC Name are arranged in the following major/minor functions:

1. File Repository Management
2. Software Download
3. Platform Configuration and Initialization
4. Activity Management
5. Node Configuration

6. Recording
7. Data Requirements

1 File Repository Management

This is a one or two sentence description of what File Repository Management does.

1.1 OPS CM shall provide the following file repositories:
- 1.1.1 Certified Application Repository (CAR)
- 1.1.2 Uncertified Application Repository (UAR)

1.2 OPS CM shall allow for the preservation of the following file attributes for any files manipulated by an OPS CM process (as supported by the OS platform):
- a. File name
- b. Individual owner

1.3 OPS CM shall allow for the preservation of the following directory attributes for any directories manipulated by an OPS CM process (as supported by the OS platform):
- a. Directory name
- b. Individual owner

1.4 OPS CM shall provide the capability to introduce a temporary baseline into an OPS CM repository.

2 Software Download

This is a one or two sentence description of what Software Download does.

1.1 OPS CM shall provide a capability for a CLCS platform to be loaded with an SCID baseline.

1.2 OPS CM shall provide a capability for a CLCS platform to be loaded with an TCID baseline.

1.3 OPS CM shall provide a capability for an HCI platform to be loaded with user and positional home directories.

1.4 OPS CM shall provide an HCI GUI to allow authorized users to request and execute download functions.

1.2.3 CSC Name Performance Requirements

Provide a bulleted list of performance requirements that describe the performance requirements for the CSC. These can be described in terms of the threads that are involved and their required performance. The performance requirements must be stated in quantifiable, measurable parameters. These requirements should be stated in the same order as major/minor functions above and should use the same convention for major/minor function headings.

1 Node Configuration

1.1 OPS CM shall be able to load and initialize a new TCID on a test set of up to ***TBD*** nodes within 15 minutes.

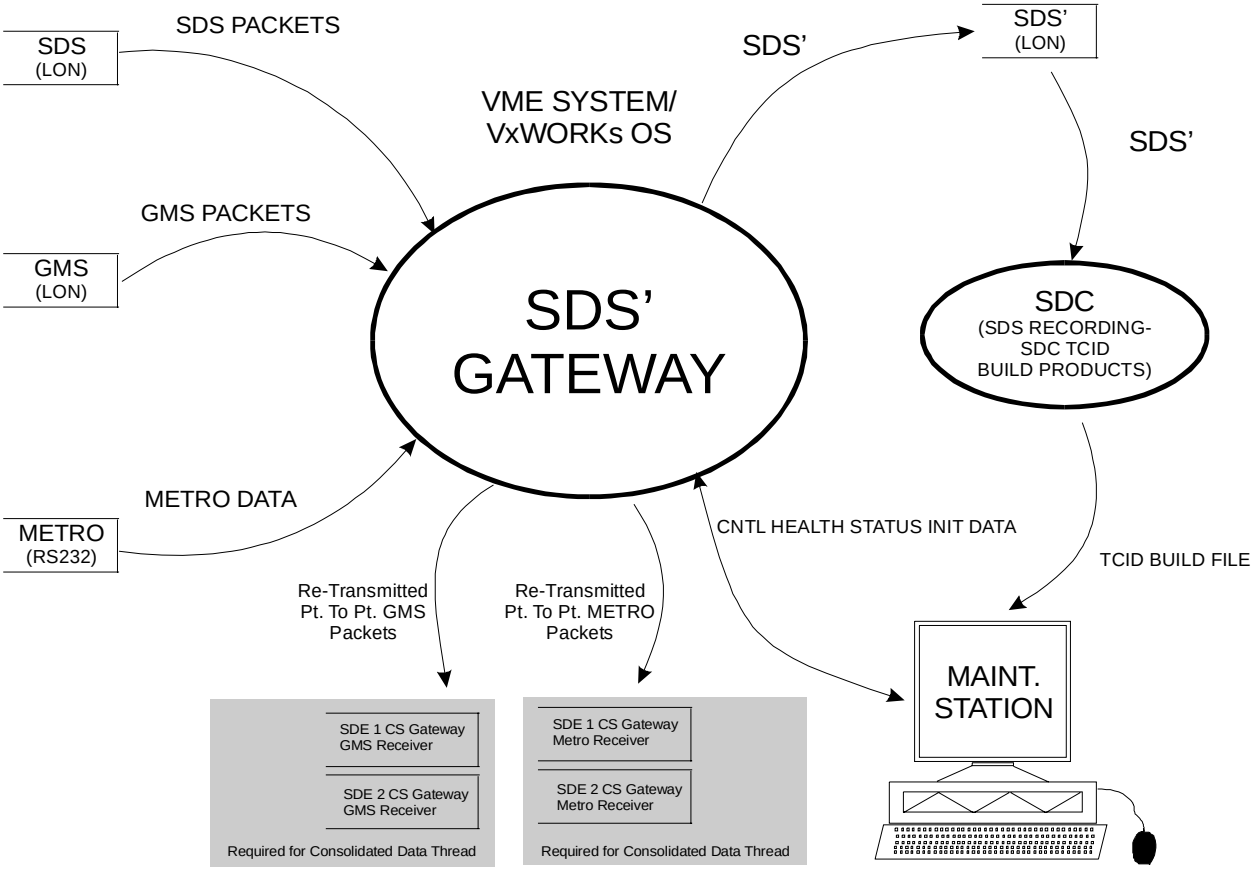
Note: Initialization time ends when the OPS CM process initiates the user application software start-up script(s) for HCI, CCP, and DDP. It ends for Gateways when the Gateway moves into the operational mode (time constraints assume there is no man-in-the-loop for the combined download & initialization process.

1.2 OPS CM shall load SCID and TCID software on a launch configuration of up to ***TBD*** nodes in 2 hours or less.

1.2.4 CSC Name Interfaces Data Flow Diagrams

This section provides a description and diagram of all of the interfaces to the CSC. Describe in words and lists the interfaces. Use diagrams like the following to depict the interfaces to the CSC.

External Data Flow Diagram Example



The purpose of the External Interface diagram is to show the interfaces between the CSC and the external elements it interfaces with. It conveys in a pictorial format all of the input and output streams that the CSC deals with, but not their content. Include with the diagram a short paragraph describing the data flow so that a reader can pick up the document and understand the data coming into the CSC and the data sent out of the CSC without a conversation with the developer.

Note: Do not use the underscore_character between words. This is an English language document that we want people to be able to pick up and read in their natural language, not a pseudo programming language.

Note: This is the end of the Design Panel 2 Required material. The information covered below is for Design Panel 3.

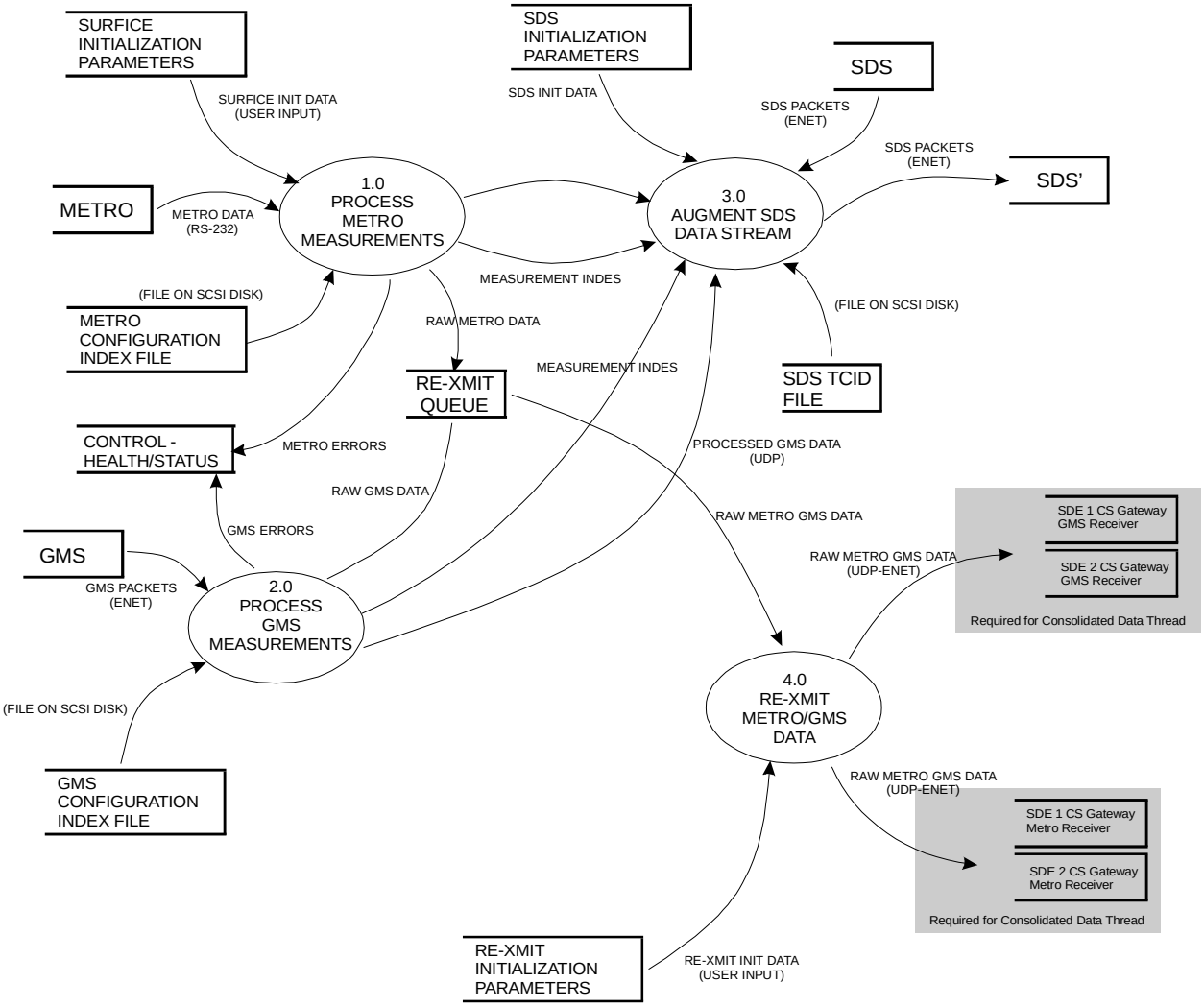
1.3 CSC Name Design Specification

Include a brief description of the architecture of the CSC. If there are any priorities associated with the design they should be specified here.

1.3.1 CSC Name Detailed Data Flow

This data flow provides a pictorial representation of the data flow between external sources and destinations and the major and minor functions of the CSC. This is an example detailed data flow diagram.

Detailed Data Flow Diagram Example



The purpose of the Detailed Interface/Data Flow diagram is to show all of the interfaces, internal as well as external, of the CSC. It conveys in a pictorial format all of the input and output streams that the CSC deals with, but not their content. The content of each of these streams of data is described in the detailed design below. Include with the diagram a short paragraph describing the data flow so that a reader can pick up the document and understand the data flow without a conversation with the developer.

Note: Do not use the underscore_character between words. This is an English language document that we want people to be able to pick up and read in their natural language, not a pseudo programming language.

1.3.2 CSC Name External Interfaces

1.3.2.1 CSC Name Message Formats

This data is the System Messages output by the CSC.

Example:

Message Number = _____
Message Group = _____
Severity = _____

GSE Gateway **I1** Adapter Failure - Polling Stopped - Switchover Requested
Status Register Contains H**#I2#** S/B H**#I3#**

Insert #1 = One Character Integer Value 1 through 8
Insert #2 = Four Character Hex Value
Insert #3 = Four Character Hex Value

Help Information Content:

Help information content will contain a breakdown of the status register showing the meaning of each bit. This file would also show (in time) the likely cause of different failure indications.

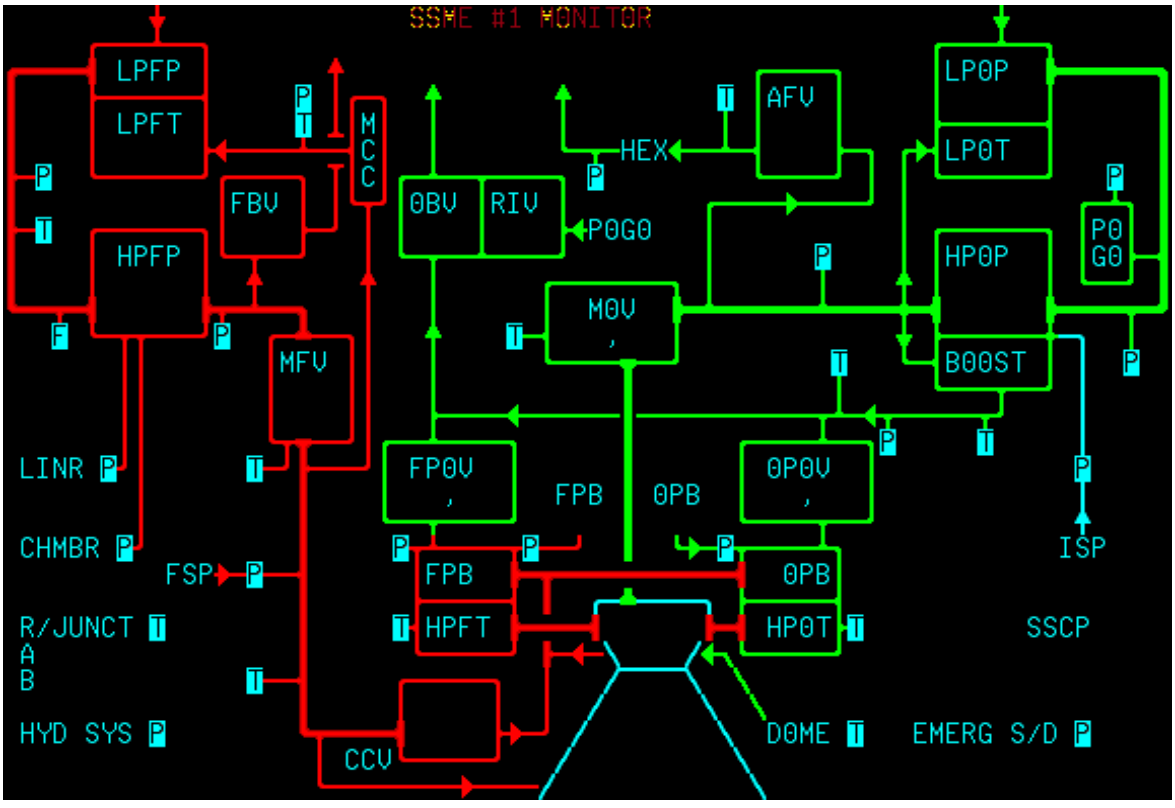
Details Information:

Details Information will be available on the Status Register only.

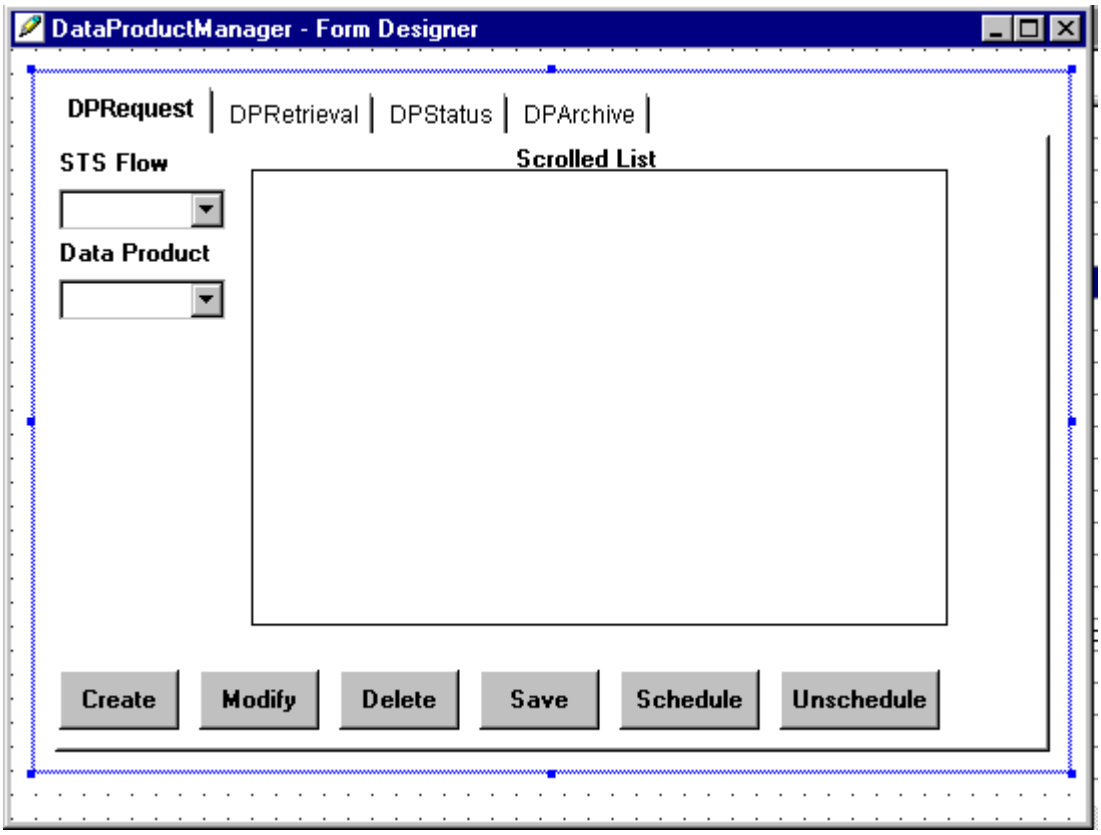
1.3.2.2 CSC Name Display Formats

This is the design of Displays produced by the CSC.

Example 1:



Example 2:

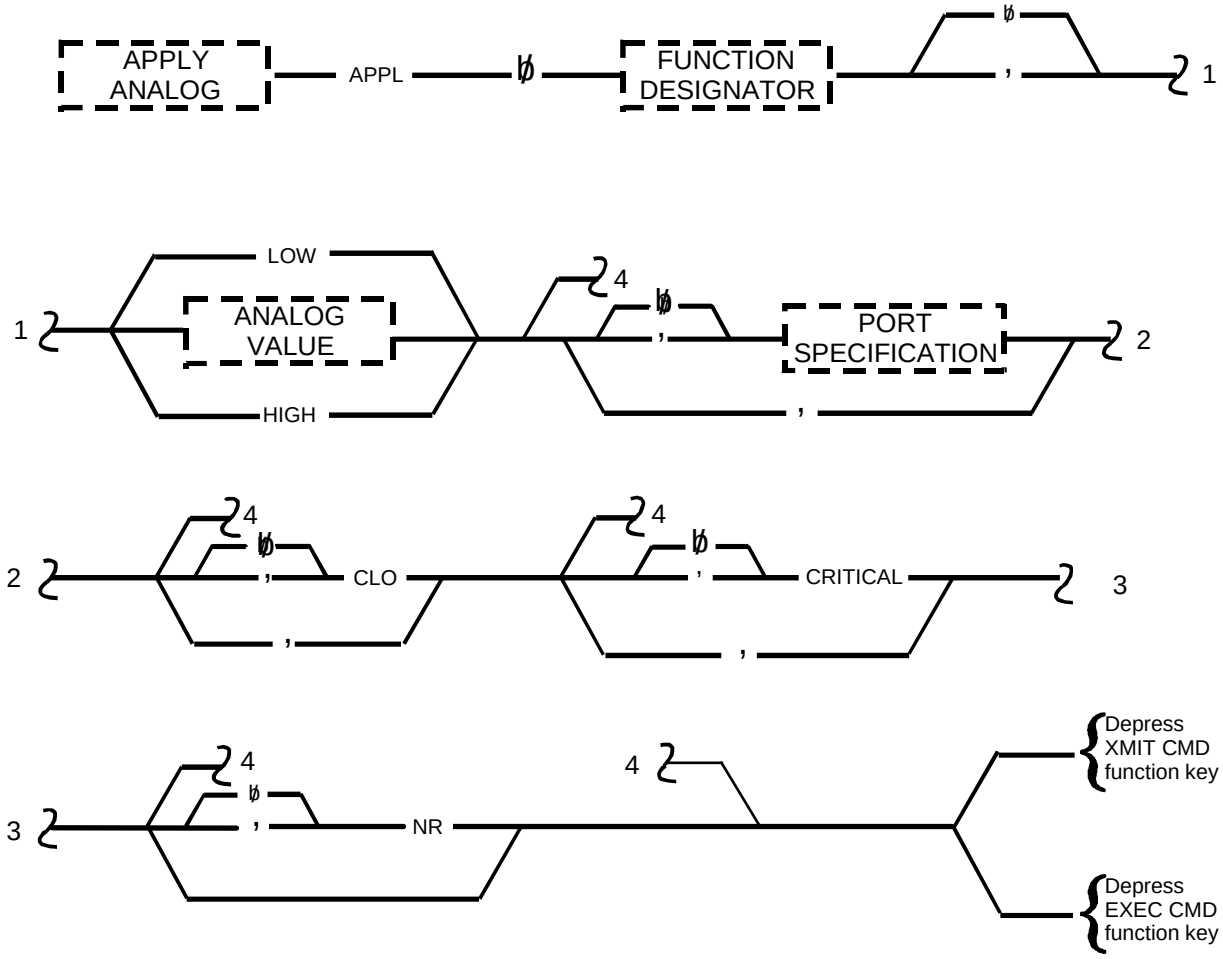

DataProductManager - Form Designer
DPRequest
DPRetrieval
DPStatus
DPArchive
STS Flow
Scrolled List
Data Product
Create
Modify
Delete
Save
Schedule
Unschedule

1.3.2.3 CSC Input Formats

This data is for CSCs that have a language like interface (e.g., Command Processor — Apply Analog)

Example:

APPLY ANALOG



1.3.2.4 Recorded Data

This area contains a table of data that is recorded by the CSC. All data being recorded must be contained in the table. List the name of each message recorded, the type of recording (listed in the example), and location the data is recorded to. Data will be recorded on the local storage device only when approved by the Design Panel. These approvals can be expected to be rare.

Name of Recorded Data	Recording Type	SDC	Local
		X	
		X	
		X	
		X	
		X	

1.3.2.5 CSC Name Printer Formats

This data documents the design of anything printed on printers.

Example:

LDB MASS MEMORY READ
CDT=-99:2359/59 GMT=132:1232/24.375 GATEWAY=LDBA CMD=MASS MEMORY READ FCNL DEST=MM TRNS ID=01E7 CPU=SDC
FTSB= 5 1 4 4 DEST=MM 1 SEQ BLKS=9

MASS MEMORY RESPONSE TIME=1232/24.531 GMT FUNCTIONAL DESTINATION= MM TRANS ID= 01E7 CAPABILITY 1 READ OF
MM2 FILE 0 TRACK 6 SUBFILE 7 BLOCK 0 BLOCK# 30 0F 31 BLOCKS READ ERRORS

0000 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 000F
0010 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 001F
0020 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 002F
•
•
01F0 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 01FF

LDB MASS MEMORY WRITE
CDT=-99:2359/59 GMT=132:1245/02.465 GATEWAY=LDBA CMD=MASS MEMORY WRITE FCNL DEST=MM TRNS ID=02F0 CPU=DPS
FTSB= 5 1 4 4 DEST=MM 1 SEQ BLKS=3 DATA:
0000 0000

MASS MEMORY RESPONSE TIME=1245/02.900 GMT FUNCTIONAL DESTINATION = MM TRANS ID=02F0
CAPABILITY 1 WRITE TO MM1 **UNSUCCESSFUL**

LDB MMU READ LOAD BLOCK
CDT=-99:2359/59 GMT=132:1247/24.449 GATEWAY=LDBA CMD=MMU READ LD BLCK FCNL DEST=MM TRNS ID=02A7 CPU=SDC
PH/LD BLK = #0302
MM VERSB=#0000 PATCH ID=#0000 FSW ID= 8 CHKSM #43A9 MM1 NOCOMP DUMP

MASS MEMORY RESPONSE TIME=1247/12.950 GMT FUNCTIONAL DESTINATION = MM TRANS ID=02A7
CAPABILITY 2 READ & DUMP LOAD BLOCK MM1 PHASE=01 LOAD BLOC0A W/O COMPARE
STATUS= SUCCESSFUL
FILE 3 TRACK 6 SUBFILE 1 BLOCK 9 BLOCK COUNT= 31
0000 9E31 B5F6 0001 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 000F
•
01F0 A1F3 3089 A1F3 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 C6C6 01FF

1.3.2.6 Interprocess Communications (C-to-C Communications?)

This is the data that is sent between CSCs that may or may not be in the same processor. Examples are the C-to-C formats that Tom Jamieson has developed for us. These formats are prepared initially by the Systems Engineering Team (Tom Jamieson) but not owned by the SEI group during the design of the CSCs that send and receive them. The SW design team is expected to

1) Assume control of the design of the C-to-C body
2) Develop the design
3) Document the design — in this document?
4) Provide the design to Tom Jamieson after DP3 approval for incorporation into the System Interface Document (TJJ is this name correct?)

Example:

Change Data Packet Payload Body Entry (Analog)

B15 B14 B13 B12	B11 B10 B9 B8 B7 B6 B5 B4 B3 B2	B1 B0
0000-1001 *	Status	FDID MSB
FDID - 16 LSB		
CC		
EU**		
EU**		

* = "this is an analog entry and 0000-1001 = 100 usec time".
** = 32 bits

~~1.3.2.7 Recorded Data~~

~~This section contains the design of all data that is recorded to the SDC or local recording media.~~

~~**Example:**~~

~~TBS~~

1.3.2.7 CSC External Interface Calls (e.g., API Calling Formats)

This is the data that is sent between CSCs via a calling mechanism (e.g., API call)

Example:

TBS

1.3.2.8 CSC Name Table Formats

This data documents the design of the tables used internal to the CSC and provided from an outside source (e.g., Gateway Table Build, OLDB, etc.)

Example:

TBS

1.3.3 CSC Name Test Plan

At a minimum the Test Plan should contain a description of:

1. The environment in which the test will take place.

2. Any unique test tools that are needed to perform the test and how they will be used.
3. The Test Cases.

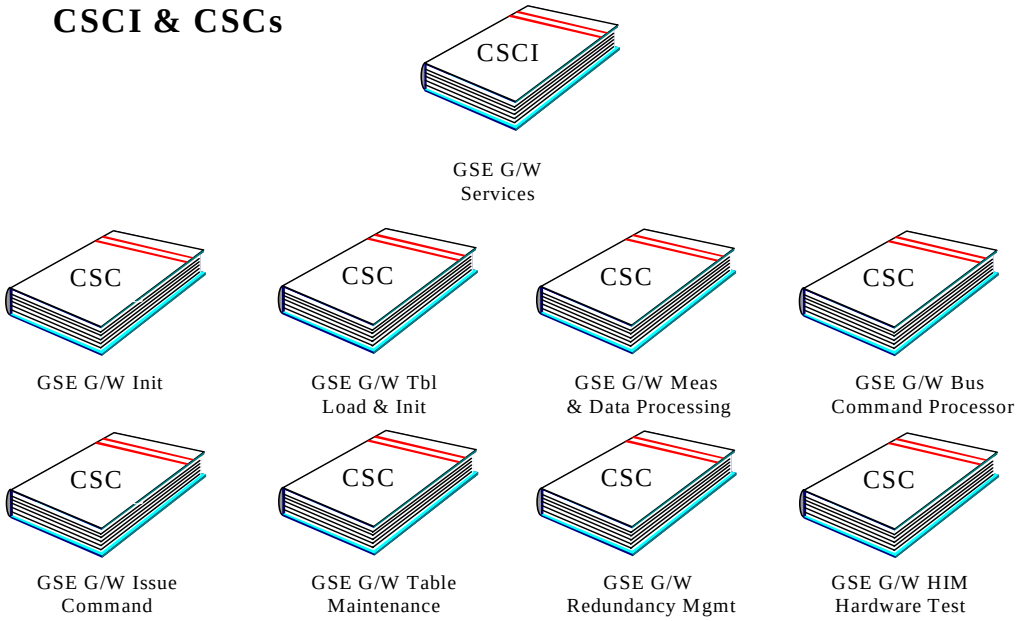
Example:

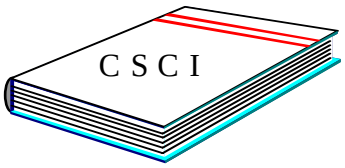
TBS

Appendix A

In most cases a CSCI is composed of the functionality contained in multiple CSCs that are part of the CSCI. The intent of the SRS/Design Specification is to capture the requirements and design of both the CSCI and its CSCs in one set of volumes. Since we are using electronic forms of documentation for the most part these should be easily captured in one place with links to others? At any rate one option for the structure of a CSCI document is as follows:

GSE Gateway Services
CSCI & CSCs



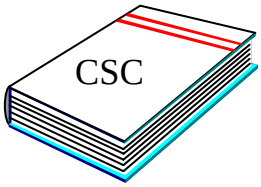


CSCI Outline

1.0 CSCI Name
1.1 CSCI Name Introduction
1.2 CSCI Name Overview
1.2.1 CSC 1 Name Document
1.2.2 CSC 2 Name Document
1.2.3 CSC 3 Name Document
o
o
o
1.2.N CSC N Name Document

Design Panel 2

CSC Requirements Spec

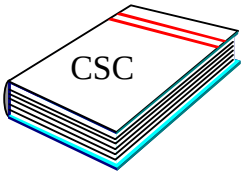


GSE G/W Init

1.0 GSE G/W Init
1.1 GSE G/W Init Introduction
1.1.1 GSE G/W Init Overview
1.1.2 GSE G/W Init Operational Description
1.2 GSE G/W Init Specifications
1.2.1 GSE G/W Init Groundrules
1.2.2 GSE G/W Init Requirements
1.2.3 GSE G/W Init Performance Requirements
1.2.4 GSE G/W Init Interfaces/Data Flow Diagrams

Design Panel 3

CSC Requirements Spec



GSE G/W Init

1.0 GSE G/W Init
1.1 GSE G/W Init Introduction
1.1.1 GSE G/W Init Overview
1.1.2 GSE G/W Init Operational Description
1.2 GSE G/W Init Specifications
1.2.1 GSE G/W Init Groundrules
1.2.2 GSE G/W Init Requirements
1.2.3 GSE G/W Init Performance Requirements
1.2.4 GSE G/W Init Interfaces/Data Flow Diagrams

Present only Changes

CSC Design Spec

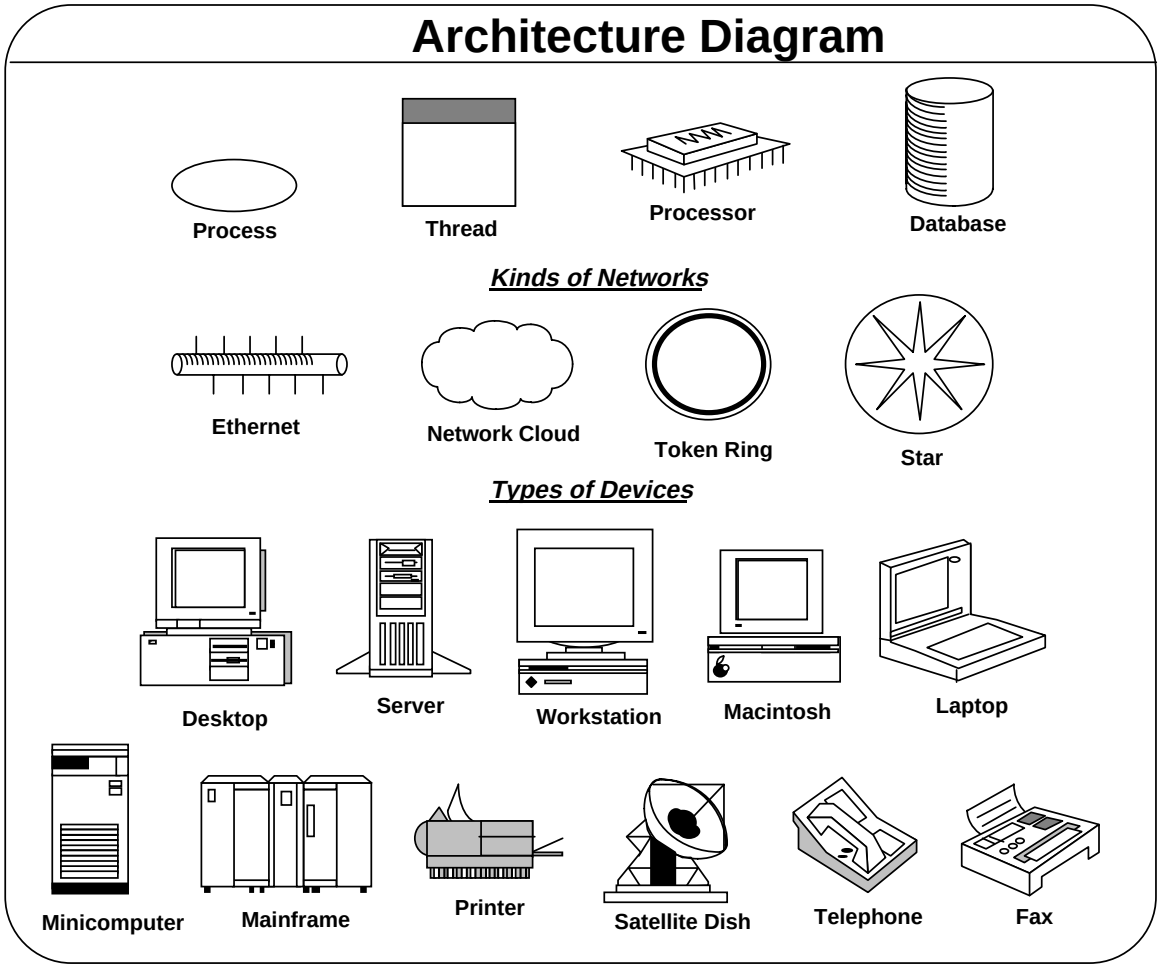
1.3 GSE G/W Init Design Specification
1.3.1 GSE G/W Init Detailed Data Flow
1.3.2 GSE G/W External Interfaces
1.3.3 GSE G/W Internal Interfaces
1.3.4 GSE G/W Structure Diagram
1.3.5 GSE G/W Test Plan

Appendix B

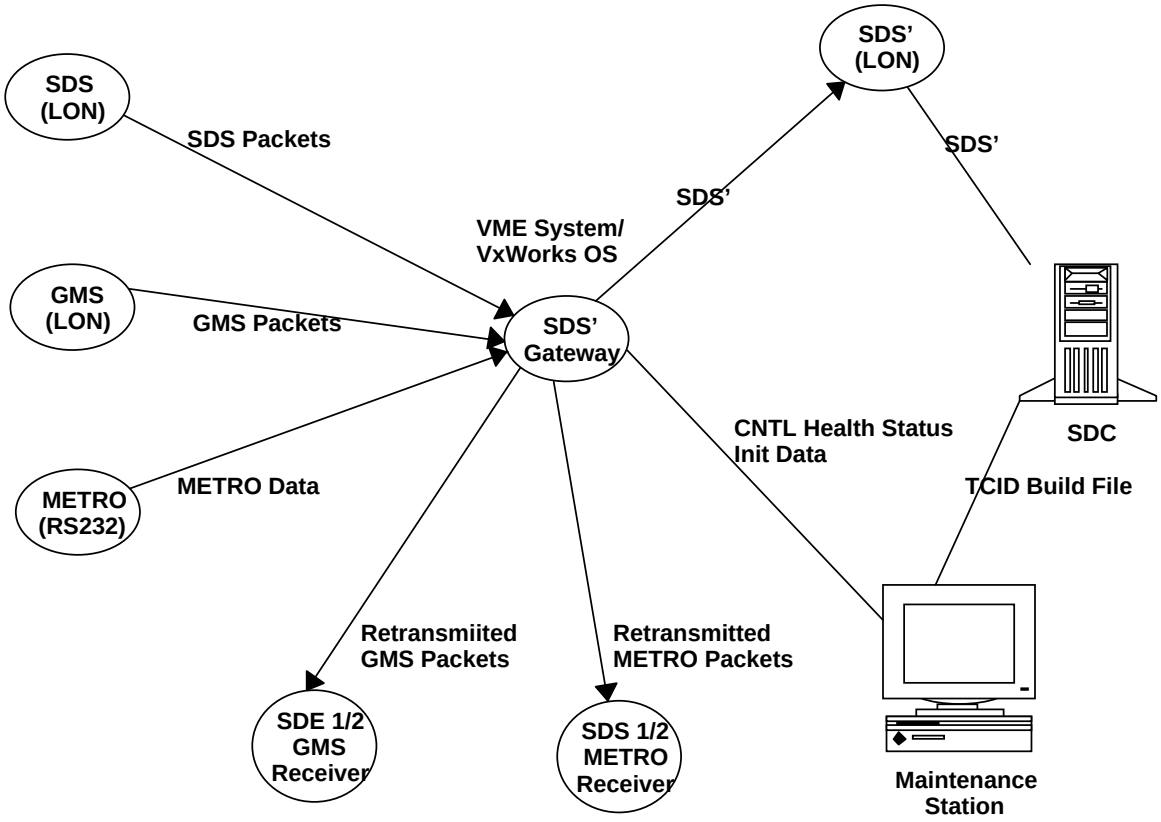
This appendix provides information that will be used for CSCs that are developed using Object Oriented Design (OOD) methodology.

Note: The information in Appendix B is preliminary and will change as the OOD methodology to be used on the CLCS project matures.

The OMT/Rumbaugh notation will be used to document the architecture according to the following legend:



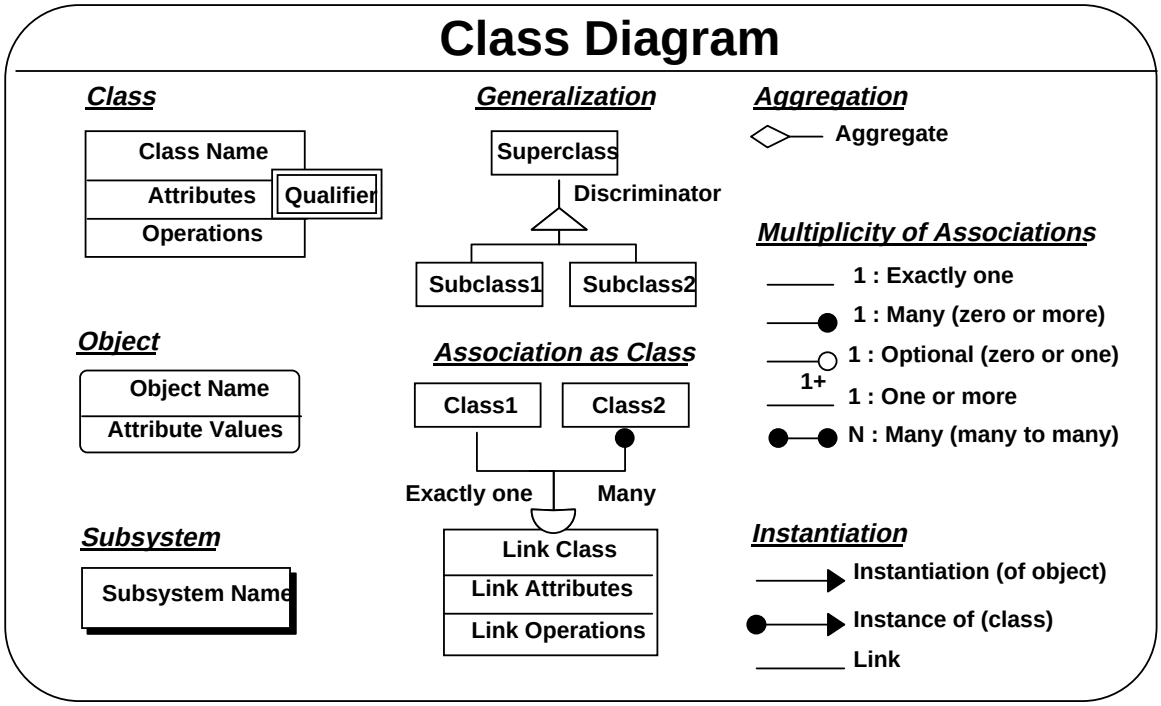
An example architecture diagram is shown below:



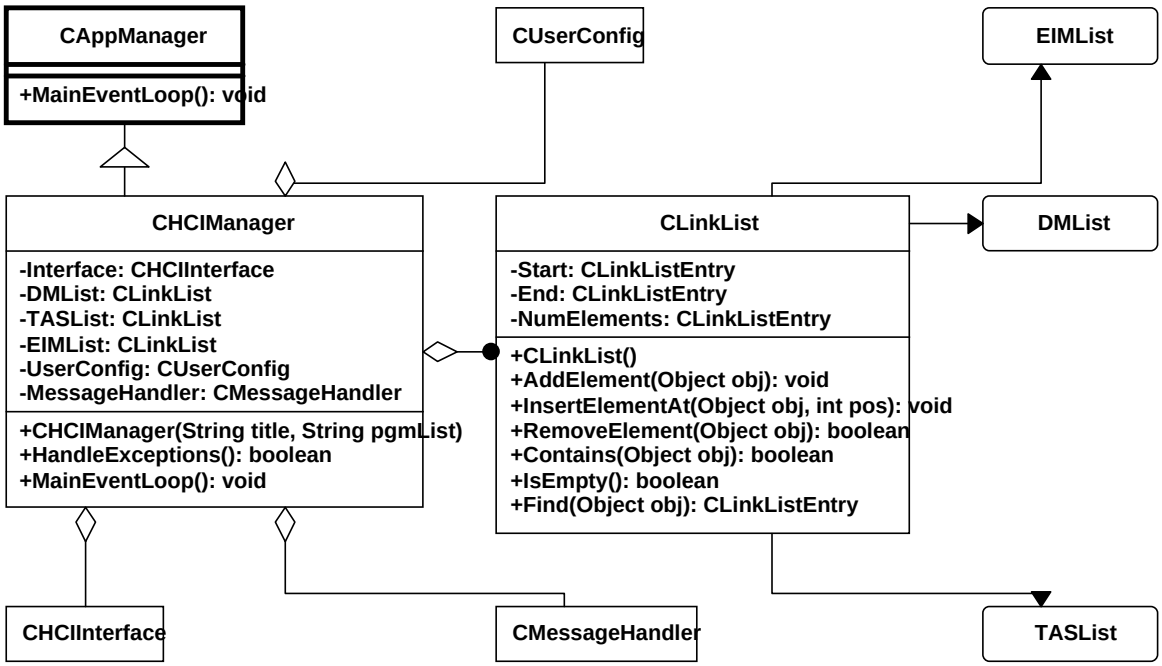
1.4 DP2

Prior to DP2, the Software Architecture Team (SAT) ~~designer~~ will decide whether to use Structured Design or OOD. If structured design is to be used, the examples used in the body of this document will be used. If OOD is to be used, the CSC designer should provide a set of preliminary class diagrams. At DP2, the focus is on requirements and preliminary design. Accordingly, the class diagrams presented at DP2 should describe the key abstractions in the requirements ("problem space" classes).

The OMT/Rumbaugh notation will be used to document class information according to the following legend:



An example class diagram is shown below:

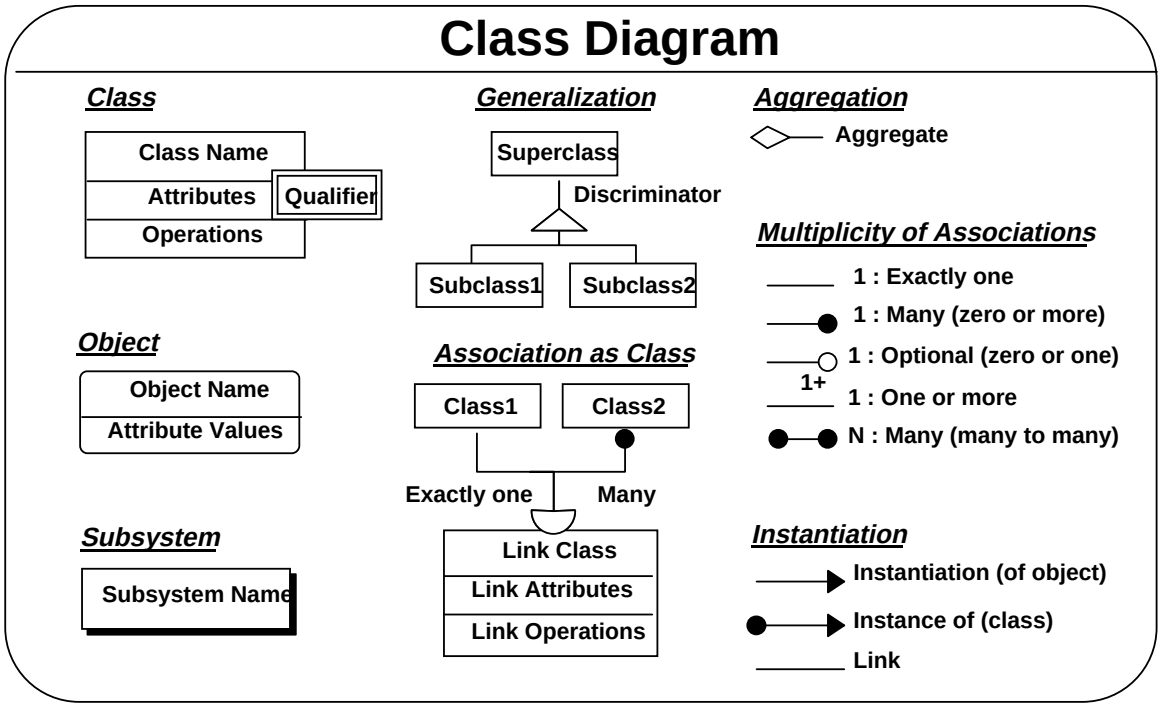


1.5 DP3

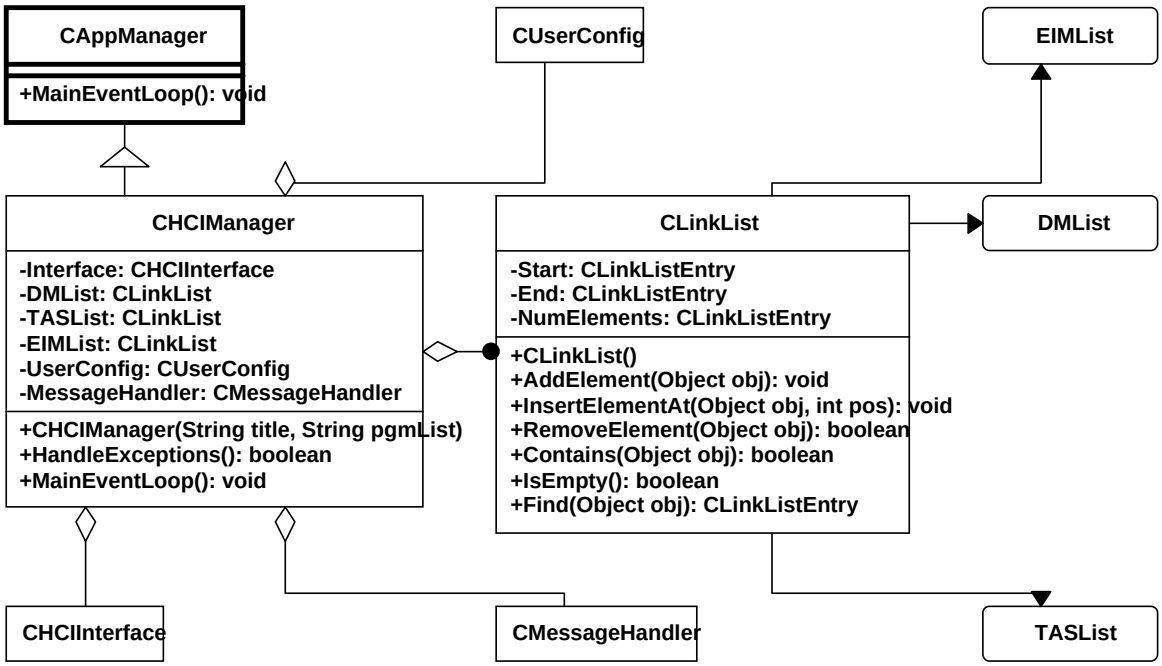
For DP3, the designer should provide a set of additional class diagrams that augment the analysis phase classes presented at DP2. Further refinements of the classes presented at DP2 may be included to provide context and aid in

understanding. The purpose of these diagrams are to document the mechanisms that will be used to implement the requirements for this CSC.

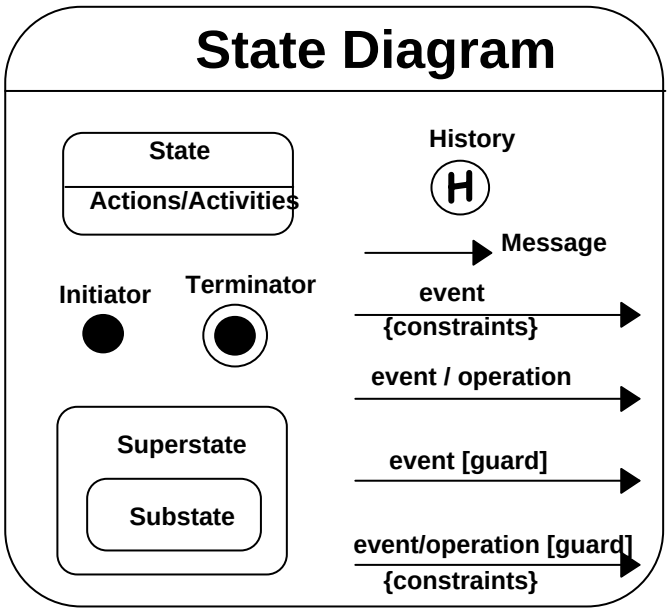
The OMT/Rumbaugh notation will be used to document class information according to the following legend:



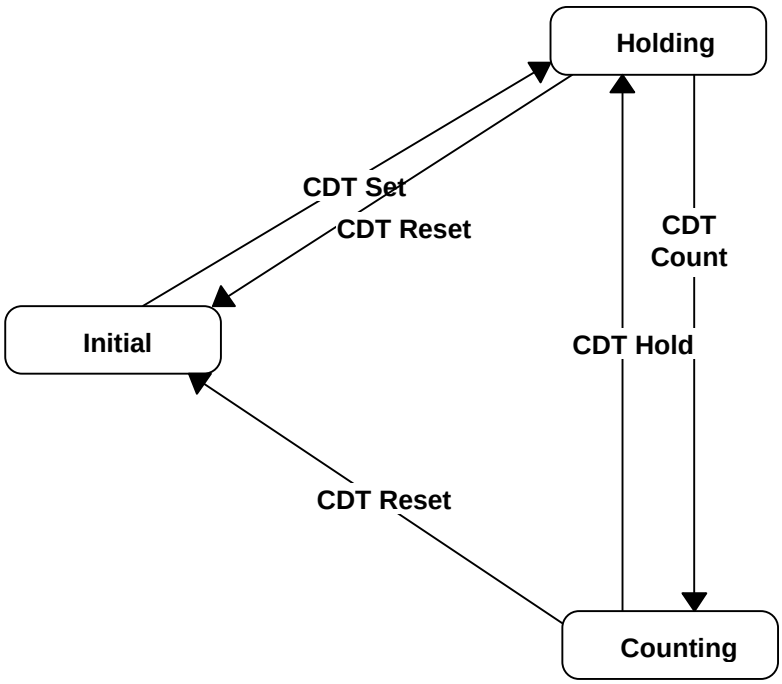
An example class diagram is shown below:



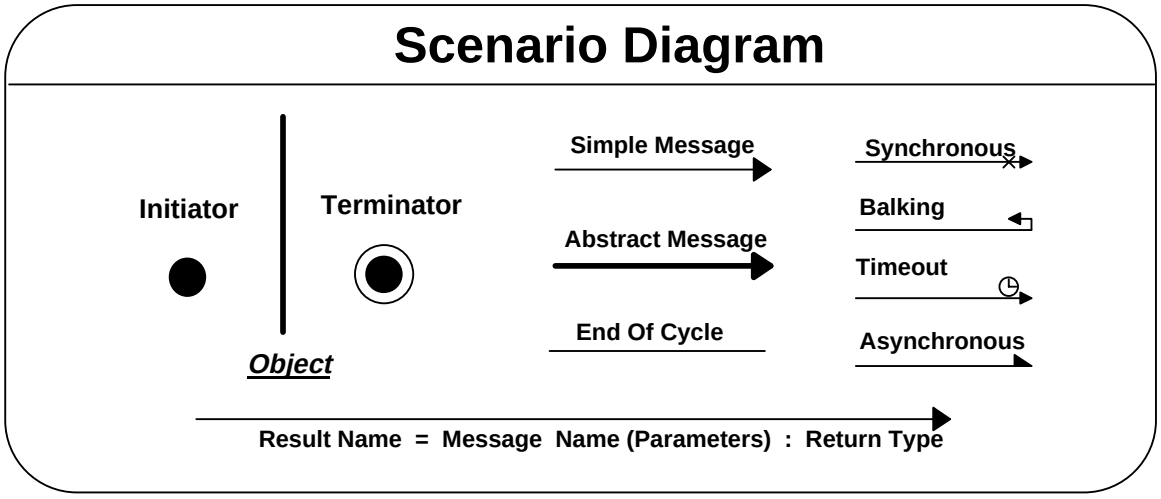
In addition, for classes that exhibit state machine behavior, a state diagram should be included that depicts the dynamic behavior of the class according to the following legend:



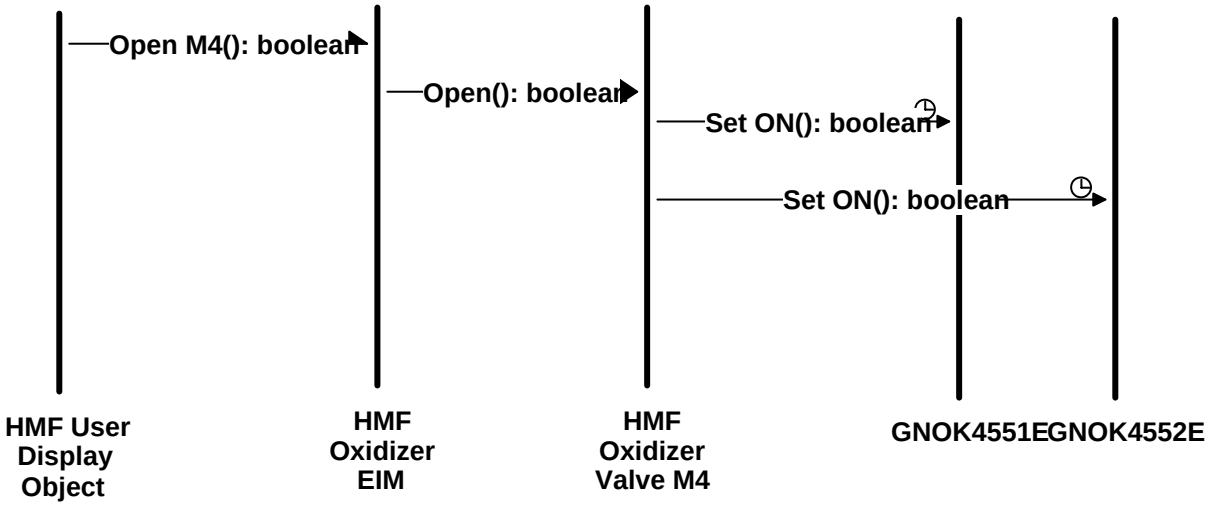
An example state diagram for a software implementation of a countdown clock is shown below:



In addition, key scenarios of the CSC's operation or key processing threads should be documented with an scenario diagram according to the legend below:



An example scenario diagram that illustrates the message flow responsible for opening a specific valve is shown below:



Appendix C

6/4/97

TO: CLCS Project Personnel
FROM: M. Dotterweich
SUBJECT: Detailed Design Panel Presentation Content

As part of an overall Panel Improvement Initiative, a meeting was held on 6/4/97 with CLCS System Engineering and Software Development / Architecture personnel to discuss "What should be presented" at the Internal and User Detailed Design Panels (i.e. DP3's). The intent is to ensure that an adequate design is developed and approved without performing a detailed design inspection at the internal or user panels. That is, present the correct level of information based on the panel audience. The following table reflects the decisions from that meeting. The following assumptions and constraints apply to those decisions.

1. The Software Requirements and Design Specification must be fully completed regardless of whether the particular section will be presented at either the internal or user review.
2. The External Interfaces (APIs), Interprocess Communications, and Table Formats defined in Sections 1.3.2.5 - 1.3.2.7 should have been reviewed via a separate meeting / distribution by the development and user community. The Software Architecture Team will be reviewing these interfaces to ensure that the proposed implementation fits within the overall software architecture. (For Redstone, this activity may end up being completed after the Detailed Design Panel, but every effort should be made to perform this activity before the internal panel is conducted.)
3. The decision on the use of structured vs object-oriented design methodologies and the associated design products has, to date, been left to the CSCI leads. This decision will be reviewed by the SAT to ensure that the system can be integrated successfully at the design and implementation levels.
4. The appropriate documentation (i.e. Software Requirements and Design Specification Template and the Software Development Plan) will be quickly updated and distributed to reflect these decisions.

An X in the following table in the Internal or User Review column means that you are to present the material in the section to the audience.

Table 1. Detailed Design Panel Presentation Instructions/Guidelines

Section Nbr	Title	Internal Review	User Review	Comments
1.1.1-1.1.2	CSC Overview and Operational Description	X	X	Use this section as an introduction. Focus on the diagram vs the text during the presentation.
1.2.2-1.2.3	Groundrules/Functional / Performance Requirements	X	X	Address only those groundrules or requirements which have been added, deleted, or changed since the Requirements Panel.
1.2.4	Data Flow Diagram	X	X	Explain the external interfaces and specifically address any changes since the Requirements Panel.
1.3.1	Detailed Data Flow or Class Diagram(s)	X		For the internal review, focus on the architecture of the CSC. What are the internal interfaces, data stores, configuration files/data, etc..
1.3.2.1	Message Formats	X	X	Present each system message, what causes it to be generated, and any specific information to be conveyed to the user which will assist in understanding the message and it's relevance/impact to the processing being performed.

Section Nbr	Title	Internal Review	User Review	Comments
1.3.2.2	Display Formats	X	X	Present each display, menu, pop-up dialog, etc. that will be developed. Discuss the information content and the user functionality available in each display.
1.3.2.3	Input Formats	X	X	Present the specific input data required of the user when interfacing with the CSC. Much of this may have been covered in the Display Formats discussion.
1.3.2.4	Recorded Data	X	X	Present and discuss the Table which identifies the data to be recorded for this CSC. Utilize the data flow diagrams as reference points during the presentation.
1.3.2.5	Printer Formats	X	X	Present each report that is to be generated by this CSC. If the only printed reports are for "print screens" of the display formats, then this area is N/A.
1.3.2.6	Interprocess Communications			These are to be covered in detail during separate reviews by SAT, peer development, and user personnel. These are primarily Interface Description Document reviews.
1.3.2.7	External I/F Calls			These are to be covered in detail during separate reviews by SAT, peer development, and user personnel. These are primarily API reviews using the UNIX manual pages format.
1.3.2.8	Table Formats			These are to be covered in detail during separate reviews by SAT, peer development, and user personnel. Most likely, these will be included in the IDD reviews/discussions.
1.3.3	Test Plan	X	X	Present a diagram showing the Test Environment (both hardware and software). Identify any unique test tools/devices required. Provide a summary of the test cases to be executed for this CSC.

Thanks for your review of this information. Please provide comments or questions on this information or any other Panel Improvement ideas to Kirk Lougheed, Ken Clark, Larry Wilhelm, or myself. We will attempt to address any concerns or change requests in a timely manner.